

Research Article

# NFT Market Segmentation Classification of Buyer Behavior Based on Blockchain Type and Marketplace Platform Using Power BI Interactive Data Visualization

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## ABSTRACT

The Non-Fungible Token (NFT) market has experienced rapid growth and high volatility, creating challenges for stakeholders aiming to understand transaction patterns and market behavior. This study addresses these challenges by employing an interactive Power BI dashboard to analyze and visualize NFT transaction data from 2021 to 2022. Grounded in descriptive and correlation analysis, the research is structured into three primary visual components: market summary, transactional insights, and correlation analysis. Using data visualization techniques and statistical correlation theory, the dashboard enables the identification of key performance indicators such as user activity, platform efficiency, and pricing dynamics. The findings reveal significant growth in NFT adoption, with 7,820 unique buyers, 7,872 sellers, and 4,327 creators contributing to the ecosystem. A strong positive correlation ( $r = 0.77$ ) between current and sale prices indicates predictive potential in price behavior. Among blockchain platforms, Solana recorded the highest total sales US\$13.0 million and royalty distributions 13,000, while LooksRare and Foundation stood out as the most profitable marketplaces for creators. The Collectibles category led in transaction volume, with collections like AbstractVerse attracting notable interest. While monthly transaction volumes varied, the overall market value remained relatively stable, peaking in December 2022. This study contributes to a deeper understanding of NFT market mechanics by combining data-driven analysis with interactive visual tools, offering valuable insights for creators, investors, and analysts navigating the digital asset landscape.

**Keywords:** NFT, Power BI, data visualization, transaction analysis, digital assets

## 1. INTRODUCTION

The emergence of NFTs has significantly accelerated the growth of both the technology and business sectors (Julianto, 2023). NFTs are digital assets that represent real-world objects such as artwork, music, in-game items, and videos (Affa.co.id in Thalib and Suci Meinarni, 2022). The NFT phenomenon has not only revolutionized the digital creative industry but has also created a new market with unique characteristics and dynamics that require a distinct analytical approach. On these platforms, investors can also trade ownership rights of the underlying NFT assets. Since NFTs are built on smart contract technology, they can be programmed in such a way that original creators receive a percentage of all future resale transactions (Pinto et al., 2022). NFTs gained widespread public attention beginning in 2017 and have continued to rise in popularity, as they are considered an accessible way to buy and sell digital artworks (Sulistianingsih & Kinasih, 2022).

The NFT market has experienced significant growth in recent years, with total transaction volumes on major platforms like OpenSea reaching billions of dollars, signaling a major shift in how digital assets are traded and collected (Sudirjo, 2023). This exponential growth has been marked by million-dollar transactions and the participation of a diverse range of actors, from independent artists to multinational corporations. However, behind this rapid growth lies a complexity in understanding consumer behavior and market segmentation, which presents challenges for industry players, researchers, and policymakers. Unlike conventional markets, the NFT market is characterized by blockchain transparency, the non-replicable nature of digital assets, and value that is highly dependent on community perception and digital trends.

NFT buyer behavior is strongly influenced by the marketplace platform used, the preferred NFT category, as well as demographic and psychographic factors that shape preferences and purchasing decisions (Sudirjo, 2023). A deep

understanding of these factors is essential in designing effective marketing strategies and making accurate business decisions within the highly competitive NFT industry.

This study aims to classify NFT buyer behavior based on marketplace categories and platforms using an interactive data visualization approach through Power BI. By conducting systematic market segmentation, this study seeks to identify patterns, preferences, and buyer characteristics, thus providing valuable insights for marketing strategy development, business decision-making, and product innovation in the NFT industry. Interactive data visualization tools like Power BI enable a deeper analysis of NFT market segmentation and help uncover buyer behavior patterns across different categories and platforms (Sudirjo, 2023). This visualization approach is chosen for its ability to intuitively communicate complex information and support in-depth data exploration.

The significance of this research lies in its contribution to a more comprehensive understanding of the NFT ecosystem, particularly in the context of consumer behavior and market segmentation. Amid the highly dynamic growth and evolution of the NFT market, this study is expected to serve as a reference for industry players in formulating more targeted strategies, as well as for academics in developing a more robust theoretical framework for the blockchain-based digital economy.

## 1.1 STUDY LITERATURE

### 1.1.1 NFT and Its Development

Non-Fungible Tokens (NFTs) are unique digital assets recorded on a blockchain, serving as digital certificates of ownership that cannot be exchanged on a one-to-one basis or duplicated, thereby ensuring authenticity and provenance of the associated digital item (Kaisto, 2024). Unlike cryptocurrencies in general which are fungible, NFT has unique characteristics that distinguish it from other digital assets.

In its development, the NFT market has experienced very significant growth. According to Dowling (2022), the NFT market capitalization reached approximately US\$24 billion by August 2021, representing an exponential growth of over 59,000% since 2018. This surge reflects the rapidly increasing adoption and interest in NFTs as a new digital investment asset class. This exponential growth indicates the increasing interest and adoption of NFT technology as a new form of digital investment.

The history of NFT began with the creation of the first NFT called "Quantum" in 2014 which was later valued at US\$7 million. As noted by Dowling (2022), the digital artwork *Everydays: The First 5000 Days* by artist Beeple was sold as an NFT for an astonishing price of \$69 million in 2021, marking a historic milestone in the valuation and adoption of digital art assets. These figures show the great economic potential in the NFT industry.

In their research, Sundari, Siti Nur Faizah, and Lailatul Rahma, the journal with a qualitative phenomenological research method explains the NFT buying and selling business on the Opensea.io marketplace from an Islamic economic perspective. This research shows that the more people who can see the opportunities and gaps in the NFT business, the more people will be involved in the NFT buying and selling business. For the seller after transaction furthermore, creators can also earn royalties every time a successful trade is made on any NFT marketplace or with peer-to-peer exchanges. Currently, NFT trading is hosted on various digital marketplace platforms such as CryptoPunks, OpenSea, and Rarible. (Uribe, 2020)

Not only limited to digital artwork, the adoption of NFT is increasingly widespread in various sectors. Fadillah (2022) explains that large companies such as Nike and the NBA have integrated NFT into their business strategies through digital products such as virtual shoes and collectible cards, opening up new markets beyond digital art. This shows the increasingly diversified application of NFT in the creative and business industries. NFT products that can be sold include artwork, game assets, photos, videos, music and so on (Sari, 2022).

In Indonesia itself, the NFT phenomenon went viral through the case of Ghozali who managed to sell 933 selfies with a total value of IDR 14 billion. This phenomenon has sparked the interest of the Indonesian people in NFT-based digital investment (Trilenia, 202). This case illustrates how NFT has become a global phenomenon that has also had a significant impact on the Indonesian digital market. Meanwhile, according to Asih Karnengsih as a Blockchain Expert, she explained that in Indonesia, Non Fungible Tokens (NFTs) are widely used for art, such as photography, digital art, digital lies, which are then collected by collectors. And everything that can be collected is expected to increase the price of the collection. And according to her, this could be a form of NFT investment instrument from the collectible side (in Saroh et al, 2023). And other advantages of the role of smart contracts in NFT ownership and copyright NFTs built on blockchain technology use smart contracts that automatically regulate ownership and royalty rights, thus providing control and legal protection for NFT creators and owners (Alis Yulia et al., 2022)

### 1.1.2 Market Segmentation in the Digital and NFT Context

Market segmentation is a fundamental strategy in marketing that has evolved along with the digital transformation. Jakfar (2023) explains that digital market segmentation currently combines various dimensions such as demographics, geography, behavior, and psychographics, allowing for more specific and effective targeting in the digital era, including in the NFT market. This multidimensional approach allows marketers to identify and target NFT market segments with more precision.

According to Ante (2021), the NFT market built on the Ethereum blockchain has shown rapid development since its inception, creating a new ecosystem where unique digital assets can be traded transparently and securely. NFTs enable the representation of ownership of non-fungible digital assets, which is different from conventional crypto assets that are fungible. The smart contract technology underlying NFTs enables automation in copyright and royalty management, so that original creators can earn a percentage of future resale transactions. This not only revolutionizes the way digital assets are traded but also opens up new business opportunities that combine technology and creativity in one decentralized platform. In addition, the NFT market displays unique dynamics, where the value of assets is heavily influenced by community perception and digital trends, thus requiring a different analytical approach compared to traditional markets (Ante, 2021).

Marketing strategy plays an important role in the development of the NFT market. According to Sudirjo (2023), effective NFT marketing strategies such as celebrity endorsements, digital art exhibitions, and limited offers can increase consumer awareness and participation in certain market segments. The results of his study showed that around 45% of respondents were influenced by marketing campaigns in their NFT purchasing decisions. This emphasizes the importance of the right marketing strategy in reaching the targeted NFT market segment.

Proietti Cerquoni (2023) emphasized that NFT opens up opportunities for brands to reach new market segments that were previously difficult to access, as well as strengthen relationships with consumers through personal and exclusive experiences. The unique characteristics of NFTs allow brands to create added value and consumer experiences that are different from conventional products, thereby attracting specific market segments.

The gamification aspect is also an important element in NFT market segmentation. Sudirjo (2023) observed that collectible NFTs often incorporate gamification elements, which increase user engagement and loyalty within a particular digital community segment. This approach shows how NFTs not only function as digital products, but also as a medium for community interaction and engagement that helps in the formation of a more loyal market segment.

### 1.1.3 Factors Influencing NFT Buyer Behavior

NFT buyer behavior is influenced by various complex factors that need to be understood in the context of market segmentation. Sudirjo et al. (2023) identified that NFT marketing strategies, including celebrity endorsements and digital art exhibitions, play an important role in increasing consumer awareness and action. The results of their study showed that around 45% of respondents stated that marketing campaigns influenced their NFT purchasing decisions. Therefore, understanding the emotional and behavioral dimensions of consumer engagement with NFTs is critical to unlocking the broader potential of blockchain technology in the consumer market, especially as the market shifts from speculation to practical applications (Brahmstaedt, 2025).

While perceived scarcity and perceived ease of use significantly positively affect consumers' intentions to purchase NFTs (Chang, 2024).

The advancement of digital technology and blockchain transparency increase consumer trust in the authenticity and security of NFTs, which are major factors in purchasing decisions (He et al., 2023; Efendioğlu, 2022, cited in Sudirjo et al., 2023). The security and authentication aspects offered by blockchain technology are added value that influence consumer behavior in deciding to purchase NFTs. NFTs can also be tracked and transferred in a secure and reliable manner (Li & Chen in Yilmaz, 2023)

Digital Society (2022) identified the phenomenon of “digital herd mentality” and consumer identity factors as drivers of NFT purchasing behavior. Consumers tend to follow trends that are considered popular in their digital communities, indicating a strong social influence in NFT purchasing decisions. This phenomenon reflects how NFT purchasing decisions are not always based on purely rational considerations, but are also influenced by social and psychological aspects.

### 1.1.4 Classification of NFT Buyers in Previous Research

NFT buyers can be classified based on various characteristics and motivations. Serambi Mekkah (2025) identified that NFT buyers can be distinguished based on investment objectives: collectors seeking artistic value and exclusivity, speculators seeking short-term profits, and users utilizing NFTs for access to certain digital communities or services. This classification shows the diversity of motivations in purchasing NFTs that need to be considered in market segmentation.

Kominfo (2024) identified the segmentation of NFT buyers consisting of institutional investors, individual collectors, and users interested in the entertainment and gamification aspects of NFTs. This segmentation shows that the NFT market is not homogeneous and consists of various groups with specific characteristics and needs.

In terms of demographics, Muttaqin (2025) stated that the characteristics of NFT buyers generally include young age, highly educated, and have an interest in blockchain technology and digital assets. Blockchain has a working system that utilizes technological advances in the form of computers which then create new blocks that are connected to each other to form a chain (Sugiharto et al in Widiawardana & Dirkareshza, 2023). This demographic profile provides an overview of the potential target market in the NFT industry that can be utilized for more effective marketing strategies.

The level of involvement is also the basis for classifying NFT buyers. Serambi Mekkah (2025) explains that NFT buyers can be distinguished by their level of involvement, ranging from passive buyers who only buy for investment, to active buyers who are involved in the community and development of the NFT ecosystem. This difference in level of involvement affects consumer purchasing behavior and interaction with NFT products.

### 1.1.5 Data Visualization and Business Intelligence in Digital Market Analysis

Business Intelligence is a series of mathematical models and analytical methodologies that exploit available data to produce useful information and knowledge for complex decision-making processes (Sonia & Gina in Steven et al, 2021). BINUS (2025) defines BI as the process of collecting, analyzing, and visualizing data to support business decision making. With the integration of Artificial Intelligence (AI), BI is increasingly sophisticated with predictive analysis capabilities and data process automation. AI-based BI allows companies to predict NFT market trends and provide optimal action recommendations in real-time, increasing the effectiveness of marketing strategies and market segmentation.

Data visualization plays a crucial role in facilitating understanding of data analysis results. According to Uhamka Repository (2023), data visualization facilitates stakeholders in understanding analysis results through dynamic graphs, interactive maps, and diagrams, thereby accelerating strategic decision making in the context of the digital market. This capability is very relevant in analyzing the complex and dynamic NFT market.

In the context of digital business, Pustakaloka: Jurnal Kajian Informasi dan Perpustakaan (2022) emphasizes that data visualization is an important tool in Business Intelligence that helps process big data into relevant information for accurate and efficient decision making. This approach is very useful in analyzing large and complex NFT market data.

The implementation of Microsoft Power BI in data processing and visualization in computer course institutions can provide several important benefits, first, Better Decision Making: By presenting data in the form of clear visualizations, institution managers can quickly understand existing trends and patterns, thus supporting more precise and data-based decision making (Julfia et al, 2024).

BINUS (2025) emphasizes that interactive data visualization in BI makes it easier to understand complex data and accelerates the business decision-making process in the highly competitive digital era. In the context of research on NFT market segmentation, Power BI as an interactive data visualization platform can be an effective tool for classifying buyer behavior based on categories and marketplace platforms, providing more comprehensive and easy-to-understand insights.

## 2. RESEARCH METHOD

This study adopts a mixed-method approach that integrates quantitative and qualitative analysis to gain a comprehensive understanding of NFT market segmentation and buyer behavior. The research methodology is designed in several systematic stages including data collection, data processing, analysis, data interpretation, and visualization using Power BI. The purpose of this method is to determine how much influence the type of marketplace and type of blockchain have on NFT purchases or transactions by measuring the ratio of the number of NFT purchase transactions based on each marketplace and type of blockchain. This study was also conducted to determine the correlation between the current price (base price or listing price offered) and the sales price (the price actually paid by the buyer).

### 2.1 DATA COLLECTION

#### 2.1.1 Data Source

The NFT Marketplace Analytics dataset is a dataset of 10,000 NFT transactions collected between January 2021 and October 2022. The dataset consists of 15 columns that include important information such as transaction ID, transaction time, NFT price, and details of the characteristics of the traded digital assets. With a file size of around 1 MB and CSV format, the dataset is designed to facilitate large-scale analysis, including exploration of market behavior, price trends, and NFT purchasing patterns. The dataset is publicly available on Kaggle via the following link: <https://www.kaggle.com/datasets/saquib7hussain/nft-marketplace-analytics>. The data used in this analysis was taken on April 30, 2025, ensuring that the insights reflect the most recent trends and conditions within the NFT market as of that

date. The dataset was selected based on several criteria, with one of the most important being its usability score of 7.06 out of 10. This score reflects user feedback regarding the dataset's clarity, completeness, structure, and ease of integration into data analysis tools. The key features of dataset are:

No.	Column Name	Data Type	Description	Example Value
1	token_id	Categorical	Unique identifier for each NFT token on the blockchain.	0x34df2e...b9a3
2	transaction_date	Datetime	The exact date and time when the transaction occurred.	
3	buyer_address	Categorical	The wallet address of the buyer involved in the transaction.	
4	seller_address	Categorical	The wallet address of the seller in the transaction.	
5	creator_address	Categorical	The wallet address of the original creator of the NFT.	
6	category	Categorical	The category of the NFT (e.g., Collectibles, Art, Gaming).	
7	collection_name	Categorical	The name of the NFT collection the token belongs to.	
8	blockchain	Categorical	The blockchain on which the NFT exists (e.g., Ethereum, Solana).	
9	marketplace	Categorical	The NFT marketplace where the transaction took place.	
10	sale_price	Numeric	The sale price of the NFT in the native cryptocurrency.	
11	royalty_fee	Numeric	The amount paid to the creator as royalties from the transaction.	
12	currency	Categorical	The cryptocurrency used in the transaction (e.g., ETH, SOL).	
13	transaction_hash	Categorical	Unique hash identifier for the blockchain transaction.	
14	current_price	Numeric	The most recent listed or estimated price for the NFT.	
15	transaction_type	Categorical	Indicates whether it is a primary sale, resale, or transfer.	

Table 1. Data Type NFT Market

## 2.2 DATA MANAGEMENT

### 2.2.1 Data Cleaning and Preprocessing

Data cleaning and preprocessing are crucial steps to ensure the quality and reliability of data before further analysis. According to Kotsiantis et al. (2020), this step includes identifying missing values, invalid data, and adjusting the data format to suit the analysis needs, which is very important to avoid bias and errors in the analysis results.

This stage aims to ensure that the NFT Marketplace Analytics dataset is clean and ready to be used for analysis or modeling. The first step involves checking the quality of the data, including identifying missing values, invalid data, and matching data type formats. This stage is carried out to ensure the reliability of the data before proceeding to more in-depth analysis. The data is then adjusted so that it can be imported into the database and analyzed using Microsoft Power BI. Microsoft Power BI can be used as an open source and is available in a web version that can be accessed via [app.powerbi.com](http://app.powerbi.com).

### 2.2.2 Data Transformation and Analysis

After the data has been successfully transformed into Microsoft Power BI, several data transformation steps are carried out. The main focus of this stage is to create new, more informative features from the NFT Marketplace Analytics dataset. The activities include:

- Creating extra tables for collection name type, blockchain type, category name, and marketplace type.
- Creating a new variable total selling value that sums up the total of all NFTs sold according to sales price
- Extracting the day of week and month features from the transaction sales date column.

### 2.2.3 Data Analysis

Data analysis was conducted using an integrated approach that combines statistical and machine learning techniques to gain a deeper understanding of user behavior and NFT market dynamics. One of the main methods used is cluster analysis, where algorithms such as K-means and hierarchical clustering are applied to identify market segments that share similar characteristics. This segmentation is based on attributes such as purchase motivation, transaction behavior, and preferences for certain types of NFT marketplaces and blockchains, allowing for a more structured mapping of user profiles.

In addition, association rule mining is utilized to explore hidden relationship patterns between various elements, such as the relationship between NFT categories, marketplace platforms used, and buyer characteristics. These association patterns provide insight into consumer tendencies in making purchases across categories or platforms.

## 2.2.4 Data Visualization

The results of the data analysis are visualized using Microsoft Power BI to create an interactive dashboard that facilitates understanding of NFT market segmentation. Based on the characteristics of multidimensional and complex segmentation data, the visualization system is designed with a layered approach. The interactive dashboard is the main choice because of its ability to display comprehensive market segmentation from various categories, collections, marketplace types, and blockchain types that allow dynamic data exploration.

To analyze the correlation between the current price variable and the sales price, the quick measure feature is used, namely the correlation coefficient. Knowing the correlation results in this case aims to determine the relationship that is created so that creators can create price listings by considering the desired sales price expectations.

This visualization methodology is designed by considering the specific characteristics of each data dimension, ensuring rigor and reliability in the research process, and producing visual representations that are not only informative but also interactive and intuitive. This makes it easier to understand the complexity of NFT market segmentation and make strategic decisions based on comprehensive insights.

## 3. RESULTS AND DISCUSSION

### 3.1 Data Model

The data model in this study was designed using the star schema approach, which is a common structure in Business Intelligence and data warehouse systems due to its ability to support multidimensional analysis and query performance optimization. The initial dataset used consisted of one main table that functions as a transaction recorder, namely the `nft_marketplace_analytics` table. This table includes quantitative and categorical attributes related to transaction activity in the NFT marketplace. However, considering the need for complex data aggregation and visualization presentation that requires flexibility especially in sorting based on non-numeric attributes that are not always representative when done by default ascending or descending a normalization process was carried out on the data structure.

Normalization is done by separating descriptive attributes into dimension tables, while quantitative metrics are maintained in the fact table. The `nft_marketplace_analytics` table remains at the heart of the data model as a fact table that stores key metrics such as `Current_Price`, `Last_Sale_Date`, and `LastSale_Day`. It also contains foreign keys that reference five dimension tables there are `Collection Name Type`, `Verified Collection Type`, `Marketplace Type`, `Category Name`, and `Blockchain Type`. Each dimension table plays a role in representing contextual entities related to NFT transactions, and is connected to the fact table via a one to many relationship using primary key and foreign key pairs.

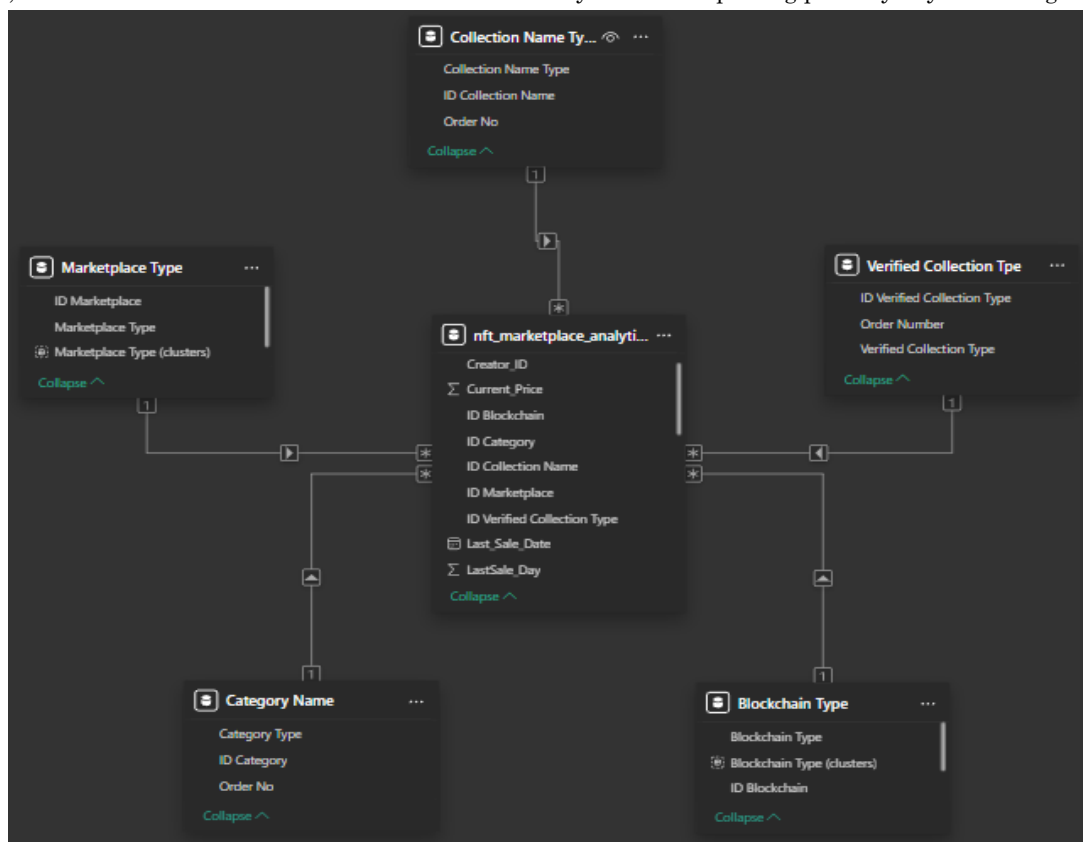


Figure 1. Data Model of NFT Market Segmentation

This approach not only improves readability and efficiency of data management, but also supports the creation of dynamic and interactive visualizations at the implementation stage of the analytical dashboard. The resulting star schema structure facilitates data exploration based on various important dimensions such as digital asset category, blockchain type, collection classification, verification type, and marketplace used. The transformed and normalized data model is shown in **Figure 1**, which shows the relationships between entities in the schema centered.

### 3.2 Dashboard

The following is a dashboard created using Power BI. Dashboard is a solution in presenting and visualizing data. By using the dashboard system, strategic data and information can be displayed quickly, online, and easily understood by organizational leaders (Ningsih et al, 2025). This dashboard consists of three main pages, each presenting information with a different focus. In general, the first page displays the data view, the second page contains transaction data, and the third page illustrates the relationships and correlations between the data. A more detailed explanation of each page will be provided in the following section.

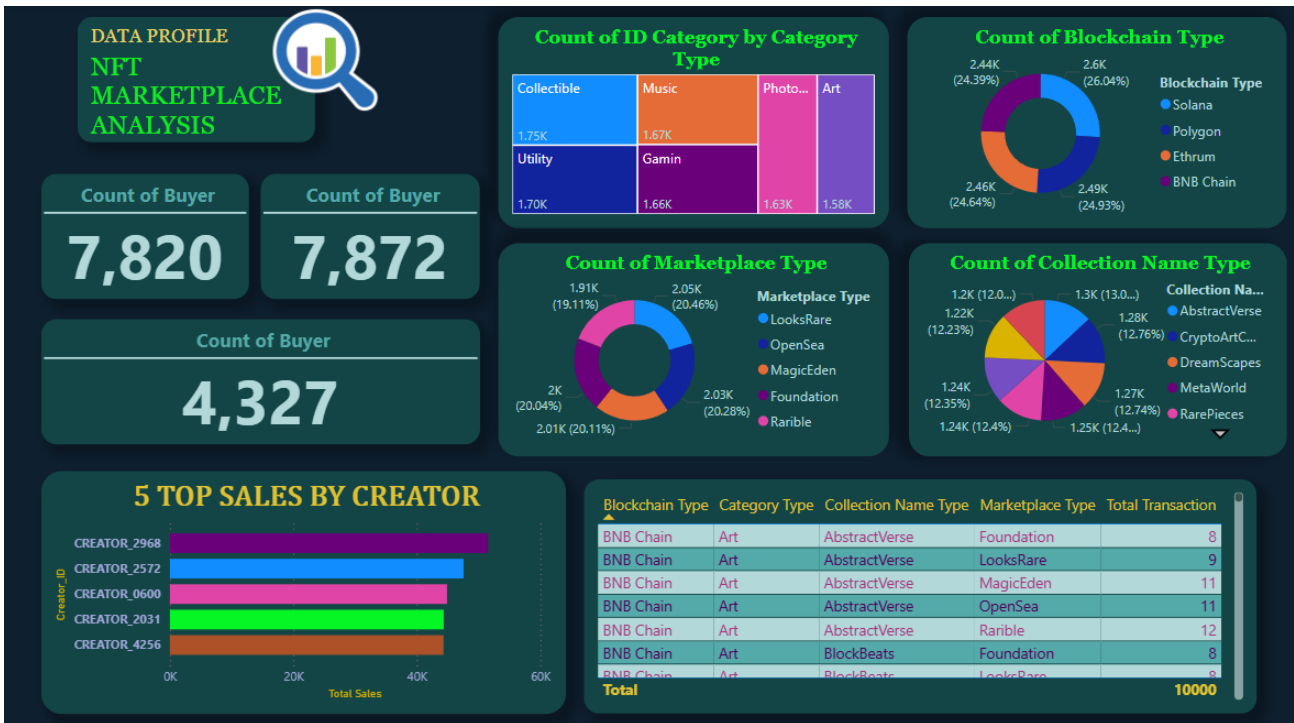


Figure 2. Data View

On the **Figure 2** of the NFT market analysis dashboard, a comprehensive summary of the dynamics of the NFT ecosystem during 2021 and 2022 is presented. This data includes the number of unique buyers, sellers, and creators, as well as the distribution of transactions by category, collection, blockchain, and marketplace.

The number of NFT buyers reached 7,820, sellers 7,872, and creators 4,327, based on the distinct count calculation that counts each unique entity without duplication. This growth reflects the increasing interest and adoption of NFTs among users. According to a report by NonFungible.com, the number of unique or token. These tokens have registered and immutable information, serving as proof of authenticity. Key features include irreplaceability, rarity, indivisibility, and uniqueness ( Zhang in Chen, 2024). NFT buyers increased from 75,144 in 2020 to 2,301,544 in 2021, indicating a tremendous surge in adoption. The increase in the number of sellers indicates higher market liquidity, allowing for more transactions and a wider variety of offerings. Data shows that the number of unique sellers increased from 31,774 in 2020 to 1,197,796 in 2021. The increasing number of creators indicates a healthy ecosystem, with more individuals or entities contributing to the creation of digital content. In 2021, the NFT market generated over US\$700 million in royalties for creators, indicating significant revenue potential for content creators.

In terms of categories, NFT transactions were dominated by the Collectibles category with around 1,750 transactions, indicating high interest from users in collectible digital assets. In contrast, the Art category recorded the lowest number of transactions, around 1,580, which may reflect different market segmentation or user preferences. Based on the collection name, AbstractVerse took the top spot with around 1,300 transactions. However, the difference in the number of transactions between this collection and the others was not too significant, indicating a relatively even distribution of interest among the various NFT collections.

In terms of blockchain types, Solana dominated NFT transactions in this data, in contrast to the previous trend where Ethereum was superior. Solana’s dominance reflects significant growth in the number of wallets and transaction volumes on the platform, indicating increasing adoption and diversification in the NFT ecosystem. According to data from CryptoSlam, the sales volume of Solana-based NFTs has surpassed US\$5 billion, with over 2.2 million buyers and 1.6 million sellers. (Cointelegraph)

For marketplaces, LooksRare leads with around 2,050 transactions or 20.46% of the total, followed by OpenSea, and Rarible with the lowest number of transactions at around 1,910 or 19.11%. Marketplaces with high transaction volumes indicate user trust and preference, although it is important to consider factors such as fair trading practices and transparency in assessing the performance of the platform. However, it is worth noting that some platforms such as LooksRare have seen a significant decline in trading volumes after the practice of wash trading, which had previously artificially inflated volumes, was reduced. (Medium)

The dashboard also provides in-depth information on the distribution of transactions by combination of category, collection type, blockchain, and marketplace. This kind of analysis allows for a more granular understanding of user preferences and NFT market dynamics. For example, transactions in the Art category can be further analyzed to see which marketplaces this category is most purchased on and using which blockchain. This kind of information is invaluable for market participants, collectors, and analysts who want to understand trends and patterns in NFT trading, as well as to identify opportunities and strategies in this ever-evolving ecosystem. Additionally, the dashboard displays the top five creators by transaction volume, with creator\_2968 leading the list. The dominance of these creators shows the significant influence of a particular individual or entity in the NFT ecosystem, both in terms of transaction volume and the popularity of their work.

Overall, this data depicts a dynamic NFT ecosystem with variations in user preferences across categories, collections, blockchains, and marketplaces. These trends reflect the evolution of the NFT market and the importance of understanding the factors that influence trading activity in this ecosystem.

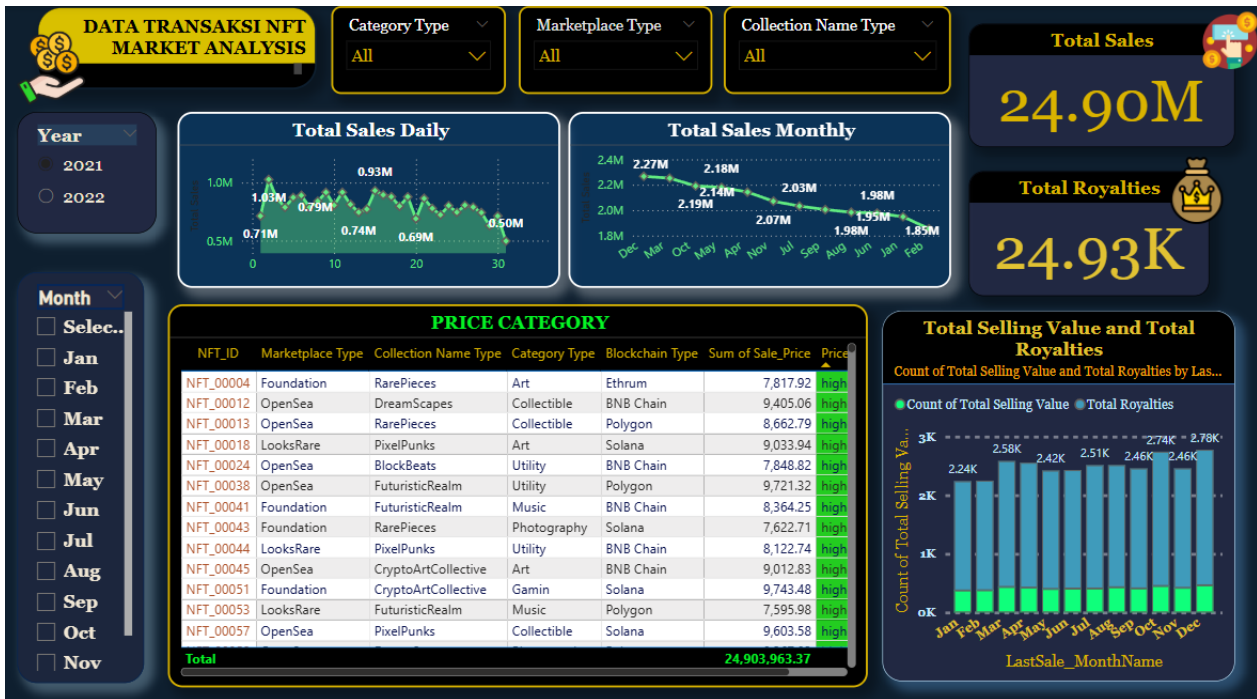


Figure 3. Data Transaction View

On the Figure 3 of the NFT market analysis dashboard, interactive visualizations are presented that provide in-depth insights into the dynamics of NFT transactions. Elements such as slicers, area charts, line charts, information cards, NFT selling price tables, and stacked column charts are used to illustrate daily and monthly sales trends, NFT price distributions, and the relationship between sales value and royalties received by creators.

Slicers allow users to filter data based on specific categories, collections, blockchains, or marketplaces, so that analysis can be focused as needed. Area charts and line charts are used to display daily and monthly sales trends, providing a visual representation of market activity fluctuations over time. Information cards display key metrics such as total sales and total royalties earned, providing a quick overview of overall market performance.

The NFT sale price table categorizes prices into three groups: ‘lowest’ (less than 3,500), ‘middle’ (between 3,500 and 7,500), and ‘highest’ (more than 7,500), marked in red, orange, and green respectively. This classification helps in

identifying the distribution of NFT prices in the market and understanding the price preferences of collectors. According to a study by ChainCatcher, most NFT collections show a price distribution concentrated around a base price, with a few high-value items significantly affecting the market capitalization of the collection. (ChainCatcher)

A stacked column chart is used to compare the sale value with the total royalties received by creators. This visualization shows how many NFTs are re-sold and the extent to which creators receive royalties from those transactions. However, it is important to note that royalty enforcement in the NFT market is challenging. Several major platforms such as OpenSea and Blur have stopped enforcing royalties by default, resulting in a decrease in creators' income from secondary sales. In response, Yuga Labs has partnered with Magic Eden to ensure automatic royalty payments on its new Ethereum marketplace. (Vogue Business)

Overall, the dashboard provides a comprehensive analytical tool to understand NFT market dynamics, including sales trends, price distribution, and royalty mechanisms. This information is essential for creators, collectors, and market analysts to make informed decisions in the ever-evolving NFT ecosystem.

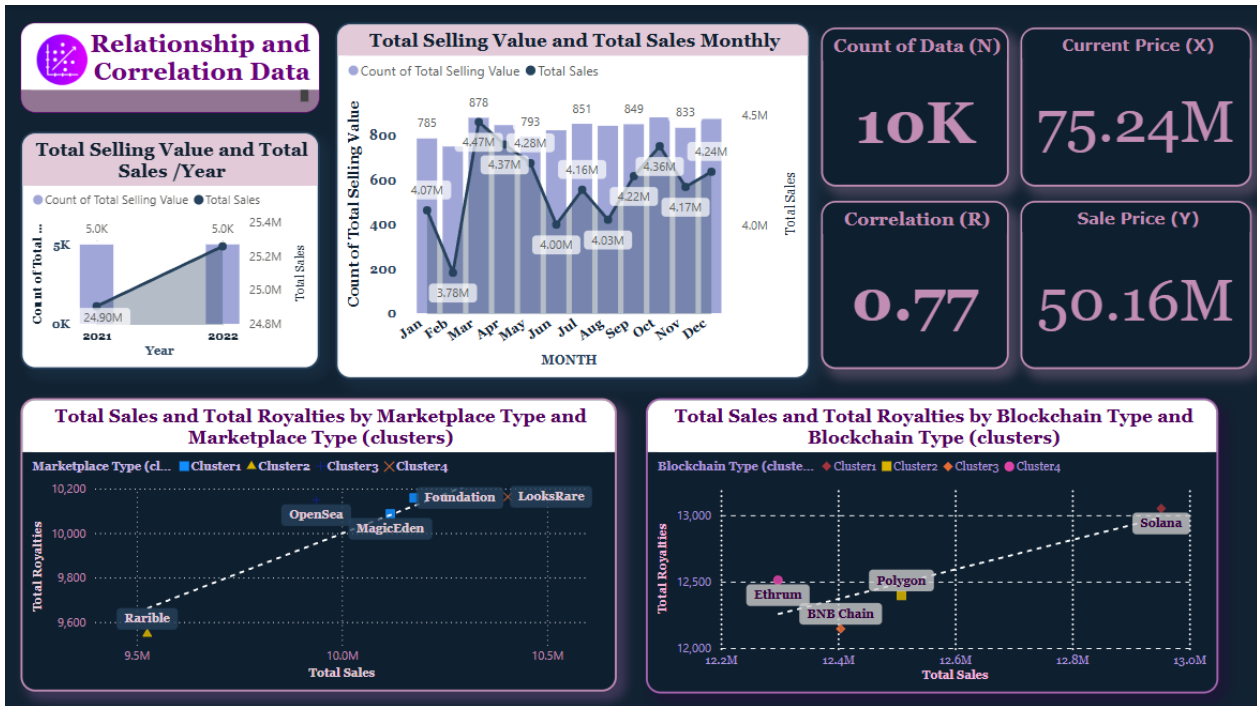


Figure 4. Relationship and Correlation Data

Figure 4 illustrates the visualization of the relationship between data columns totaling 10,000. From the dashboard in figure three, the author analyzes how much the correlation value is between current price and sales price using a quick measure with variable X or independent variable is current price and dependent variable or Y is sale price. The results obtained show a correlation of 0.77, this figure is a positive value indicating a positive correlation, namely if one variable increases, the other variable also increases. The correlation value of 0.77 is included in the interval range of 0.61 -0.80 indicating a strong level of relationship (Sanny and Dewi, 2020). The level of relationship can be seen from how big the correlation value is, the closer to the value of +1 or -1, the stronger the correlation level will be and vice versa, both positive and negative. This means that every additional value of the current price variable in this study will increase (increase) the value of the sales price variable as well (Arya, 2020)

In addition to the correlation results, the dashboard page in Figure 3 also shows the relationship between numeric variables depicted by a scatter chart with the X axis (horizontal) showing total sales, the Y axis (vertical) showing total royalties, and each point on the chart represents the marketplace and blockchain NFT, in the marketplace type chart, the lowest total sales are at 9.5 M and with the lowest total royalties at 9,600, the rare marketplace is among the smallest in terms of both sales and royalties compared to other platforms in this chart. The foundation and looksrare are marketplace between the highest total sales of 10.5 M and the highest total royalties at 10,100, which means that these two platforms are the most profitable platforms in terms of royalties and sales, this is ideal for creators or sellers they are on the top right. Opensea and magiceden have stable performance, approaching the high average but not as optimal as foundation and looksrare. Clustering in this case shows that there are differences in characteristics between marketplaces, and this grouping can help strategy analysis, for example, to choose the best platform depending on the objectives of either volume or royalties.

The second scatter chart is the relationship between blockchain types and total sales and total royalties, each point represents a blockchain grouped according to clusters one to four. Solana is in the top right, meaning it is the best in sales and royalties with the highest total sales of 13.0M and the highest total royalties of 13,000, with this position Solana is suitable for NFT projects that want to maximize exposure and income. After Solana is followed by Polygon with total sales of 12.5 M and total royalties of 12,600 showing good and stable performance in the middle of the top of the chart, Polygon could be a balanced choice between low costs and decent results. Ethereum and BNB Chain are included in the cluster with low total sales, namely between 12.2 M and 12.3 M with Ethereum's total royalties slightly above BNB Chain with a range of 12,500 to 12,300. These two blockchains are in the bottom left, indicating lower performance compared to other blockchains. These two clusters are suitable for certain target markets or low-cost strategies, but are not optimal in terms of sales results and royalties.

This dashboard page is also equipped with two additional graphs, these graphs show that there was a significant increase in total selling value and total sales from 2021 to 2022, where total sales increased from around 24.90M to 25.4M. On the monthly graph, it can be seen that although the number of transactions (count of total selling value) fluctuated, total sales were relatively stable in the range of 4.0M–4.4M. The peak of transactions occurred in May with 878 transactions and August with 851 transactions, but the highest sales value occurred in December with 4.5M. This indicates that the frequency of sales is not always directly proportional to the sales value, indicating the potential for an increase in the value per transaction in certain months such as December.

#### 4. CONCLUSION

The analysis presented across **Figures 2 to Figure 4** of the NFT market dashboard highlights the rapid evolution and increasing complexity of the NFT ecosystem during 2021 and 2022. The data reveals substantial growth in user engagement, with 7,820 unique buyers, 7,872 sellers, and 4,327 creators recorded, indicating expansion and diversification in market participation. This is further supported by global trends, with the number of unique NFT buyers rising from 75,144 in 2020 to over 2.3 million in 2021, and sellers increasing nearly 38-fold, emphasizing heightened liquidity and market interest. In terms of categories, Collectibles led with approximately 1,750 transactions, followed closely by the Art category with around 1,580 transactions, suggesting varying user preferences. AbstractVerse ranked as the most active collection with approximately 1,300 transactions, although overall interest across collections appeared relatively evenly distributed.

From a blockchain perspective, Solana emerged as the dominant chain, surpassing Ethereum in NFT activity. This shift reflects Solana's broader ecosystem growth—achieving over US\$5 billion in total sales, with 2.2 million buyers and 1.6 million sellers involved. Marketplace activity also varied, with LooksRare leading in transactions (~2,050 or 20.46% of the total), although its performance was affected by the reduction of wash trading. OpenSea and Rarible followed, underscoring the importance of transparency and fair trading practices when evaluating platform activity.

**Figure 3** provides deeper transactional insights through interactive visualizations that track daily and monthly sales trends, pricing distribution, and royalties to creators. NFTs are classified into three price tiers — low (<3,500), middle (3,500–7,500), and high (>7,500) — to clarify pricing segmentation. The correlation between current price and sale price was measured at  $r = 0.77$ , indicating a strong positive relationship and suggesting that price trends can be a reliable predictor of sale prices.

**Figure 4** explores the relationships between key numeric indicators. A scatter plot highlights Solana as the most profitable blockchain with US\$13.0 million in sales and 13,000 in royalties, making it the optimal platform for creators seeking maximum returns. Polygon follows with a balanced performance, while Ethereum and BNB Chain, once market leaders, now trail in both sales and royalties. Regarding marketplaces, Foundation and LooksRare are ideal for maximizing royalty and sales values, whereas OpenSea and Magic Eden maintain stable but less optimal performance. Time-series graphs show that total NFT sales increased from US\$24.90 million in 2021 to US\$25.40 million in 2022, marking a modest 2% growth. Interestingly, peak transaction months such as May (878 transactions) and August (851 transactions) did not coincide with the highest sales value, which occurred in December (US\$4.5 million). This suggests that fewer but higher-value transactions occurred toward the year's end, highlighting a shift in buyer behavior and the importance of targeting high-value periods this “The NFT market is highly heterogeneous, with different user behaviors emerging across platforms, categories, and creator types.”

#### RECOMMENDATION

1. For NFT creators and sellers, it is recommended to utilize platforms such as Foundation or LooksRare, which have consistently shown high performance in terms of sales and royalties. However, it is still necessary to be aware of practices such as wash trading, and choose a platform that is transparent and ethical.
2. For the launch of new collections, Solana and Polygon can be strategic choices because both show high performance and good cost efficiency. Meanwhile, Ethereum and BNB Chain can be utilized for certain market strategies with

lower costs, although the yields are not as high as the two blockchains.

3. Investors and collectors should pay attention to seasonal patterns in monthly charts to identify optimal times to buy or sell NFTs, such as taking advantage of the end-of-year momentum that shows an increase in transaction value.
4. Analysts and NFT platform developers need to continue to monitor changes in user behavior through cluster analysis as shown in the scatter plot, because differences in characteristics between marketplaces and blockchains can provide important insights into product and market strategies.
5. Finally, protection of creator royalties needs further attention, especially in the context of policies of large platforms that are starting to eliminate the royalty system by default. Collaborations such as between Yuga Labs and Magic Eden can be examples of initiatives that support the sustainability of the creator economy.

With an in-depth understanding of this dashboard, stakeholders in the NFT industry can make smarter and more strategic decisions in navigating this ever-growing market.

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## AUTHOR'S CONTRIBUTIONS

All authors discussed the results and contributed to from the start to final manuscript.

## CONFLICT OF INTEREST

The authors declare that they have no competing interests.

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